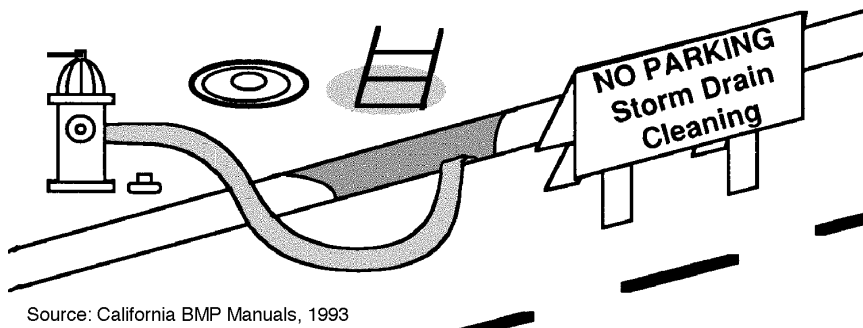


ACTIVITY: System Flushing

CP – 20

**Targeted Constituents**

! Significant Benefit	™ Partial Benefit	" Low or Unknown Benefit
! Sediment	" Heavy Metals	" Floatable Materials
" Nutrients	" Toxic Materials	" Oxygen Demanding Substances
	" Oil & Grease	" Bacteria & Viruses
		" Construction Wastes

Implementation Requirements

! High	™ Medium	" Low
" Capital Costs	" O & M Costs	" Maintenance
		" Suitability for Slopes >5%
		" Training

Description

A storm drain is “flushed” with water to suspend and remove deposited materials. Flushing is particularly beneficial for storm drain pipes with grades too flat to be self-cleansing. Flushing helps ensure pipes convey design flow and removes pollutants from the storm drain system. This management practice is likely to create a significant reduction in sediment if flushed effluent is properly collected or treated.

Approach

- # Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- # Whenever possible, flushed effluent should be collected and pumped to a sediment trap, or basin, or a detention pond.
- # Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed up water and resulting in the cleaning of the storm drain segment.
- # If the flushed water does not drain to a stormwater treatment device (e.g., detention pond or swale), then a second inflatable device, placed well downstream, may be used to re-collect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to a stormwater treatment practice. In some cases, an interceptor structure may be more practical or required to re-collect the flushed waters.

Requirements

- # Cost Considerations

- Unless flushing to a dry/wet detention pond, the collection of liquid and sediments may be costly in terms of pollutant removal benefits.

Regulations

- TDEC regulations exist prohibiting the discharge of soil, debris, refuse, hazardous waste, and other pollutants that may hinder the designed conveyance capacity or damage stormwater quality or habitat in the storm drain system. This includes flushing a system to “Waters of the State”. TDEC should be consulted if this practice is planned.

Equipment

- Water source (water tank truck, fire hydrant).
- Sediment collector (eductor/vacuum truck, dredge).
- Inflatable devices to block flow.
- Sediment/turbidity containment/treatment equipment required if flushing to an open channel.

Limitations

- # Most effective in small diameter pipes (36-inch (0.91 m) diameter pipe or less, depending on water supply and sediment collection capacity).
- # Available water source.
- # May have difficulty finding downstream area to collect sediments.
- # Requires liquid/sediment disposal.
- # Disposal of flushed effluent to sanitary sewer may be prohibited in some areas.

Additional Information

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet (213.3 m). At this maximum recommended length, the percent removal efficiency from the pipe at the time of flushing ranges between 65-75 percent for organics and 55-65 percent for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

Primary References

California Storm Water Best Management Practice Handbooks, CDM et.al. for the California SWQTF, 1993.

Caltrans Storm Water Quality Handbooks, CDM et.al. for the California Department of Transportation, 1997.

Subordinate References

Dry Weather Deposition and Flushing for Combined Sewer Overflow Pollution Control, U.S. EPA, EPA-600/2-79-133, August 1979.